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ABSTRACT

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TECHNICAL REPORT SAM-D 76-1

A POSTULATED MECHANISM THAT LEADS TO MATERIALIZATION AND DEMATERIALIZATION OF MATTER AND TO ANTIGRAVITY

Thomas E. Bearden

8 October 1975

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Redstone Arsenal, Alabama

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From the standpoint of general relativity, it is well known that mass may be regarded as a curvature or bending of ordinary three-dimensional space. Einstein's spherical model of the macroscopic universe, which provides a closed cosmos, is also well known. Einstein's spherical model of the cosmos may be extended by regarding the closure of a three-dimensional universe bending back upon itself as a universal and holographic process. In the resulting model, any fundamental particle is regarded as one holographic closure of its entire external universe inside itself, and each and every particle of mass is regarded as such a closure. Since the rate of curvature (as measured by the smaller diameter) is much greater for an electron than for the macroscopic universe, then one would expect to find a correlation between the rates of closure and the field forces existing between particles. This is quite noticeably so. The classical radius of the macroscopic universe is on the order of 10^{42} times as great as is the classical radius of the electron. Further, the electrostatic field between two electrons is on the order of 10^{42} times as great as is the gravitational field between them. One would logically expect the greater rate of curvature and the smaller diameter, being the greater closure effect, to provide, correspond to, or result from greater force field. Thus Feynman's problem [1] that must be solved to accommodate a unified field theory has an indicated resolution, that of the multiple, holographic closure of three-dimensional space by differing rates of bending. This resolution results in a universe that is a single giant hologram; and each particle of mass in the universe, being a portion of the overall universal hologram, contains the entire universe closed inside itself.

With this holographic approach, the electrical field, in a sense, is simply a gravitational field that has been turned "inside out" in a new universal closure at a bending rate on the order of 10^{42} times greater. This is also consistent with Santilli's proof of the falsity of the classical assumption that the electromagnetic field generated by the basic charged constituents of any neutral massive body with zero electric and magnetic moments does not contribute to its gravitational field. Instead, the electrical field and the gravitational field are either partially or totally the same thing [2]. It is also consistent with one of the paradoxes of the axiom of choice; namely, that one can cut a ball into a finite number of pieces and rearrange them to get two balls of the same size as the original one [3].

The problem in understanding these apparent paradoxes is caused by a shortcoming in one of the fundamental laws of logic, which states that a thing cannot be identical to its opposite; i.e., $A \neq A$. This error in logic has already been corrected by the principle of the boundary identity of exact opposites, proposed by the author as a fundamental correction to the stated classical law [4]. On their common boundary, exact opposites are identical. For example, the edge or surface of a finite solid belongs to the solid (thing) and to empty space (nonthing).

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Since the surface is identical to itself, the proof of the principle is obvious. The principle also removes many of the formidable difficulties in metaphysics, foundations of physics, and foundations of mathematics. The principle, e.g., solves the philosophical problem of change, resolves how a line (length) can be composed of points (nonlengths), resolves the wave/corpuscle question that is only evaded by the principle of complementarity, and resolves such logical problems as "it is true that this statement is false."

Further, the author has been able to derive a fundamental model for the physical process of observation itself by abstracting a fundamental mass particle as a "perceptron" and considering it as simply a physical gadget that accomplishes the process of physical perception (detection of physical change) [5]. Using this approach, a totally new defining equation for mass itself has been shown [6]. Mass becomes a totally operationally derived quantity and is expressed as a specialized time rate of change of action. This is consistent with the view that matter and energy are one and the same thing, neglecting constants of proportionality; since energy is the time rate of change of action, it follows that mass must be a time derivative of action also. The approach is also consistent with the hidden variable approach to physics; the collective output of the perceptron may be said to create or generate perceived (observed) physical phenomena, while the input to the perceptron is considered to be unperceivable (unobservable) since the perceiving/observing process has not operated upon it. Since everything in physics may be referred to perceived phenomena, modelling of the process of physical perception itself is the most fundamental approach that can be taken. Further, if a transfer function for the perceptron can be found, then the known empirical data of physics can be put into the output side of the transfer function, and it will generate a model of the input side, unperceived reality. Thus, unperceived reality can at least hypothetically be modelled.

Such a transfer function has indeed been found, although it is highly controversial. The required transfer function represents a fundamental restatement of the Heisenberg uncertainty principle for the condition of hidden variable superposition [7]. Nevertheless, using the approach it has been possible to derive Newton's laws of motion (relativistic form) [8], the law of gravitation [9], and Einstein's postulates of special relativity [10]. It has also been possible to state a solution to the heretofore unresolved ontological problem of the nature of being [11,12], and to derive a theory to provide a basis for noncausal phenomena (psychic phenomena) [13].

In this report, the author suggests a mechanism to explain why the electron in orbit around a hydrogen nucleus violates classical electromagnetic theory and does not radiate, even though it is accelerated. It is hoped that this mechanism will also enable an explanation of energy states (levels) and the connection of radiation absorption and emission with them, along the lines called for by Taylor and Wheeler as needing further work [14].

First, generate a new concept as to the nature of a photon. To begin, the second postulate of special relativity is stated, "The speed of light is the same to every observer," as "every photon in the universe is moving at the speed of light relative to every fundamental particle of mass in the universe." Specifically, a typical electron and a typical photon is chosen to examine. Consider the observer to be standing on the electron in an inertial frame, and he sees the photon as a massless entity traveling at the speed of light, c, as shown in Figure 1. Now allow the observer to conceptually tiptoe over to the

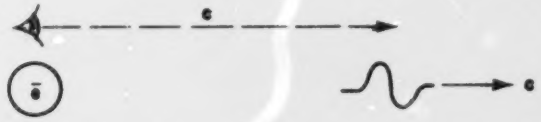

Figure 1. Einstein's second postulate.

photon and stand on it, looking back at the electron. We now insist that the corollary to Einstein's postulate must also be true: "Every fundamental particle of mass in the universe is moving at the speed of light relative to every photon in the universe." Therefore our observer must now see the electron moving at the speed of light relative to himself, as shown in Figure 2. But now we apparently have a paradox by ordinary logic. It is widely interpreted that a mass cannot travel at the speed of light because it would theoretically become infinite at that speed. This paradox has a fundamental resolution: in this case, by the fundamental principle of the boundary identity of exact opposites, infinite mass (infinite with respect to a particular system) is identical to zero mass (with respect to the same system). One may in bewilderment ask how that can be; it can, however, be simply explained.

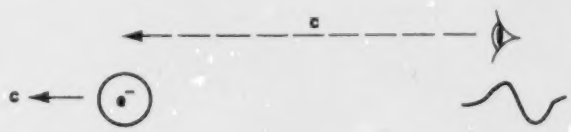

Figure 2. Corollary to Einstein's second postulate.

It can be first stated that one measures mass by measuring resistance to an accelerating force. That is, the magnitude of the "mass" is simply a statement of the magnitude of that resistance to a disturbing or accelerating force.

Next, from general relativity, mass may be regarded as a curvature or bending of three-dimensional space. From special relativity, as the speed of a mass is observed to increase, the mass is observed to increase. Thus as a mass is observed to increase its velocity, its bending of space must be assumed to increase. Further, this mass increase may be precisely modelled, and hence the effect of its bending of three-dimensional observer space, as shown in Figure 3.

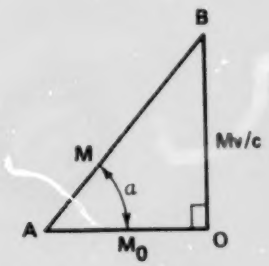

Figure 3. The bending of space and increase of mass with velocity.

In Figure 3, angle α represents the amount of curvature or bending of three-dimensional space that exists because of a mass's velocity with respect to the observer. $\overline{AO}$ represents the direction the mass is moving, as seen by the external observer. $\overline{OB}$ represents a fourth "spatial" dimension (not the time dimension) orthogonal to each of the three spatial dimensions of the external observer. $\overline{AB}$ represents the direction of orientation of the actual moving spatial dimension of the moving mass. The model can be seen to yield a valid transfer function for the process. It may be solved to give

$$M = \frac{M_0}{\sqrt{1 - \left(\frac{v}{c}\right)^2}} \quad , \qquad (1)$$

which is consistent with special relativity.

M can thus be regarded as existing in an ordinary unbent three-dimensional spatial frame, where that entire spatial frame is simply bent at angle α to the observer's three-dimensional spatial frame, which originally contained M_0. Also, note that to the original observer, any force applied to mass M, in an attempt to further accelerate it, is applied in the observer's three-dimensional space that originally

contained M_0. Thus as the velocity of the mass increases, angle α increases, and less and less of the force applied is in-line or "in a dimensional alignment" with mass M. This situation is shown in Figure 4.

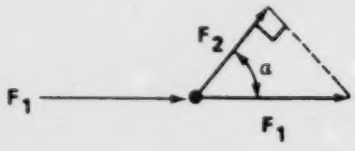

Figure 4. Effective force applied to a moving mass.

In Figure 4, F_1 is the applied force, and F_2 represents the portion of F_1 that is effective in acting on M to further increase its velocity. From Figure 4, it can be seen that

$$F_2 = F_1 \cos \alpha \quad . \tag{2}$$

Now, assume that angle α has been brought to $\pi/2$ by some means. In that case, $F_2 = 0$, regardless of the value of F_1. This is the case when $v = c$. However, note further that M_0 represents the linear intersection of M with the observer's three-dimensional space, and now $M_0 = 0$. Since there is no longer any three-dimensional intersection of M in the observer's three-dimensional space, M appears to be zero to the observer, and no physical force brought to bear at point A can change the velocity of the massless intersection of M's three-dimensional space in the observer's three-dimensional space. This situation is shown in Figure 5.

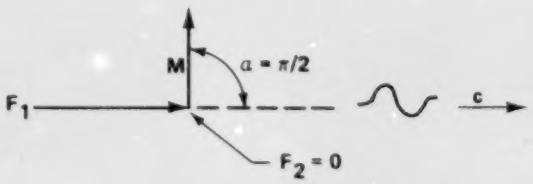

Figure 5. The situation where $\alpha = \pi/2$.

The situation in Figure 5 is now assumed to define a photon. That is, a photon is considered to be an ordinary mass existing in an ordinary three-dimensional space, where that space is bent at a right angle to the observer's three-dimensional spatial frame.

Thus to an observer in the orthogonal photonic three-dimensional frame, the photon is a perfectly ordinary mass. Further, to that observer all the mass particles in the original three-dimensional frame now appear to be photons.

In modern physics, a mass is considered to be a superposed bundle of DeBroglie waves. The velocity v_b of a DeBroglie wave is given by

$$v_b = \frac{c^2}{v_m} \quad , \tag{3}$$

where c is the speed of light and v_m is the velocity of the moving particle that is generating the DeBroglie wave. The wavelength λ of a DeBroglie wave is given by

$$\lambda = \frac{h}{p} \quad , \tag{4}$$

where h is Planck's constant and p is the momentum of the mass generating the DeBroglie wave. Note that a photon is assumed to have momentum with respect to the observer, although it has no observed mass. Its momentum p is given by the formula

$$p = \frac{h}{\lambda} \quad , \tag{5}$$

where h is Planck's constant and λ is the wavelength of the photon. Further note that the wavelength of a photon and the wavelength of its generated DeBroglie wave are the same. For example,

$$\frac{\lambda_p}{\lambda_b} = 1 \quad , \tag{6}$$

where λ_p is the wavelength of the photon and λ_b is the wavelength of its DeBroglie wave. Equation (6) may also be incorporated into the definition of a photon. It may also be taken as the mechanism that generates the situation $\alpha = \pi/2$.

We now shift our viewpoint to an electron in an inertial frame and choose to view the situation where some other electron in our distant universe starts to move, moves, and stops in our frame. Just as the distant electron is beginning to move, its DeBroglie wave has infinite velocity and zero wavelength. Therefore its DeBroglie waves are present completely across the universe, in all other particles of mass. As it acquires a finite velocity, its DeBroglie waves drop down in velocity toward the speed of light and are thus present in only a localized region around the moving electron. Then just as it stops, its DeBroglie waves again reach infinite velocity and are present in every particle of mass in the universe again. In one move of the electron, its DeBroglie waves pulsed every particle of mass in the universe twice, and those in a localized region three times. Thus any particle of mass in the universe exists in a tremendous flux of changing DeBroglie wavelengths coming from moving particles in all directions all over the universe. However, most of these DeBroglie wavelengths are changing and the frequencies are changing, so that in essence the flux is a self-zeroing random superposition. That is, for any given mass m_1 existing in that random flux, and along DeBroglie waves u_i in any particular flux direction,

$$\frac{v_m}{v_i} \neq k \quad , \tag{7}$$

where v_m is the velocity of mass m_1 during some increment of time Δt and v_i is the velocity of the DeBroglie waves along the direction $\pm \vec{v}_\pi$ during time increment Δt. Under the conditions defined by Equation (7), DeBroglie waves and a mass may be assumed not to interact.

Attention can now be directed to the Bohr theory of the hydrogen atom. By classical electromagnetic theory, the orbital electron of the hydrogen atom should radiate energy due to its acceleration and should spiral rapidly into the nucleus as it loses energy [15] (Figure 6). Instead, the electron does not radiate energy, and continues to orbit in a circle (Figure 7). By classical radiation theory, the hydrogen atom would collapse in less than 10^{-16} seconds [16]. Bohr noticed that the DeBroglie wavelength of the electron in orbit in a stable hydrogen atom was exactly equal to the circumference of the orbit, 33×10^{-11} meters [17]. Thus the stable orbit of the electron around the proton nucleus corresponds to one complete DeBroglie wave joined on itself exactly in phase. Bohr postulated that an electron could orbit the nucleus indefinitely without radiating energy provided that similar conditions were met; i.e., that its orbit contained an integral number of its own DeBroglie wavelengths. This hypothesis enabled the calculation of the various energy levels of the hydrogen atom corresponding to the orbits for n integral DeBroglie waves where n = 1, 2, 3, ... etc. The

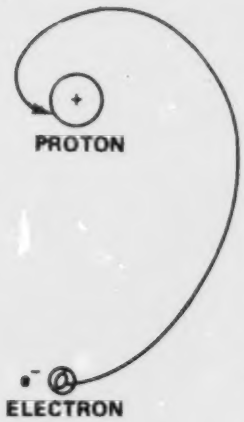

Figure 6. Classical electromagnetic prediction.

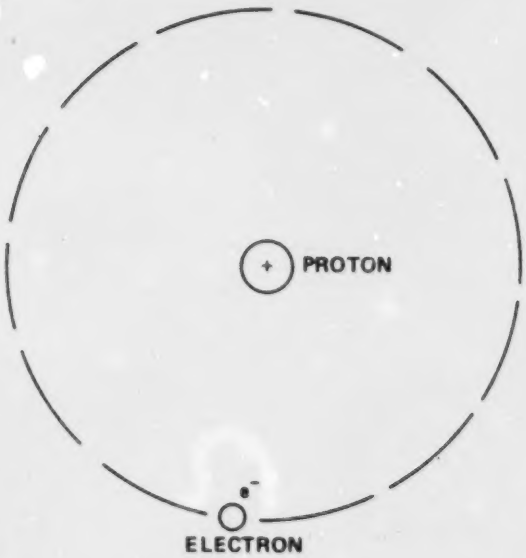

Figure 7. Actual hydrogen atom.

condition for the fourth energy level is shown in Figure 8. Conventionally, the DeBroglie waves were regarded as vibrating on the circumference of the orbit much like a wire hoop.

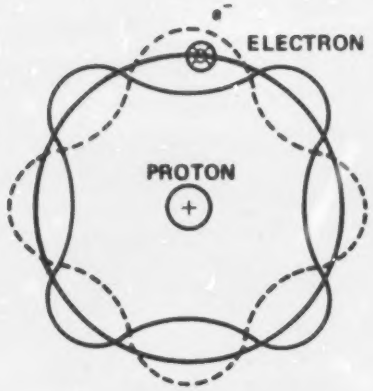

Figure 8. Fourth energy level of the hydrogen atom.

While the Bohr hypothesis described the peculiarity that existed each time the electron did not radiate when accelerating radially toward the center, it did not detail the mechanism that caused this violation of classical electromagnetic theory.

From Figure 7, the acceleration of the orbital electron is radially toward the center. Therefore the electron moves with absolutely constant tangential speed. Furthermore, its generated DeBroglie waves move with absolutely constant speed tangetially. Thus in this case

$$\frac{v_m}{v_b} = k \qquad (8)$$

Comparing Equations (7) and (8), Equation (8) may be taken as the defining conditions for the interaction of a DeBroglie wave with a mass. What could such an "interaction" mean?

Perhaps a clue lies in the nature of the model used for a photon. As shown in Figure 5, a photon is considered as an ordinary mass existing in a normal three-dimensional space bent at right angles to the observer's three-dimensional space. In Minkowskian geometry, the fourth dimension is taken as the time axis, and this axis in turn may be taken as being orthogonal to three-dimensional space. Thus one might suspect some type of interaction between time and the photonic aspects of mass. As shown in Figure 3, whenever a mass has a velocity with respect to the observer, $\alpha > 0$. That is, a timelike photonic component of mass M exists whenever $M > M_0$. Since that condition is also the condition that guarantees the

production of DeBroglie waves by M that have a finite velocity v_b where $c < v_b < \infty$, then one may suspect the interaction between some aspect of DeBroglie waves and the photonic component of a moving mass. That is, one suspects that the two aspects of mass interact since they are guaranteed by the same set of conditions. If so, it is logical to hypothesize the interaction as occurring in a timelike manner.

In special relativity, time may be considered to flow at c, the speed of light. Since ordinary changes occur at less than the speed of light, the positive time that is normally experienced may be expressed as

$$(v_s < c) \rightarrow (\Delta t > 0) \quad , \tag{9}$$

where v_s is the velocity of the physical change observed and Δt is the lapsed time observed by the observer. But since DeBroglie waves always travel faster than c, then for a DeBroglie wave

$$(v_b > c) \rightarrow (\Delta t < 0) \quad . \tag{10}$$

The DeBroglie wave appears to be traveling backwards in time because it is outrunning the flow of time itself.

Now, note that DeBroglie waves under certain conditions may be considered to carry subquantum energy; i.e., if stable DeBroglie waves are superposed in sufficient quantity, a mass or a photon results. This is analogous to a switching process that switches subquanta of energy into quanta of energy. The "switching" process is merely between the negative time stream of the DeBroglie waves to the positive time stream of the observer. The subquantum unperceived DeBroglie wave energy will be called $\overline{\Delta E}$. We are now in a position to hypothesize the interaction mechanism between a mass moving at a velocity which is stable and synchronized with the constant velocity of stable DeBroglie waves. In such a situation, if the mass is under such conditions that it is trying to radiate by classical electromagnetic theory, then it is trying to emit photons of some energy change ΔE in some finite time Δt so that a quantum change of action occurs. At the same time, the subquantum energy of the synchronized DeBroglie waves is trying to superpose and switch from a $-\Delta t$ to a $+\Delta t$. The situation is summarized as shown in Figure 9. That is, $+\Delta t$ and $-\Delta t$ simply superpose algebraically and cancel. Thus in that case, the photon becomes a totally virtual photon and is never emitted. In a sense one may think of the $+\Delta t$ as simply being ground away by the $-\Delta t$ DeBroglie "grinding stone" as fast as it is formed. This mechanism would then explain why the orbital electron of the Bohr atom violates electromagnetic theory, since classical electromagnetic theory does not incorporate any such positive and negative time interaction.

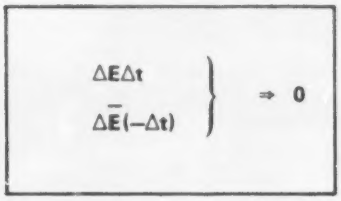

Figure 9. Synchronized interaction of DeBroglie waves and a mass.

In the late 1930's the uranium atom was first fissioned. At that moment, a forward-looking physicist could envision that the mechanism would lead to the development of atomic power and the atomic bomb, although a great deal of developmental effort lay ahead before the process could be deliberately evoked and controlled. In the same sense, if the hypothetical mechanism developed is valid, one can envision many consequences.

Suppose one is able to completely control the process and induce it at will. Further, suppose one has developed a mechanism to do this and has installed it in a disc-shaped flying object. What is involved is the ability to control the photonic and timelike aspects of a mass, in this case, of the ship. Referring to Equation (8), resonant induction of k = 1 will turn the entire ship's three-dimensional space, and hence its mass, at right angles to the observer, and the ship will simply turn into a shape comprised of photons to the observer. Yet to the occupants of the ship, it is still a perfectly ordinary ship in a perfectly ordinary three-dimensional space, and it is the observer who now appears to be a glowing shape of light. Further, the ship is not now limited to merely turning back into the observer's three-dimensional space frame. Instead, another 90° turn can be made in a higher dimensional direction, and to the original observer even the shape of glowing light has now disappeared. The ship can turn back at will, and can even turn back and "enter" the observer's three-dimensional space at some vastly distant point, without ever having "travelled" any distance at all in the observer's three-dimensional space. Further, the ship can travel backward or forward in time with ease.

For antigravity, one must again consider Santilli's proof that electricity and gravitation must be at least partially or completely the same thing. A device which can bend mass and space at will can simply create gravity or antigravity at will. Thus right angle turns at thousands of miles per hour velocity are perfectly feasible. In modern physics, e.g., one regards a mass itself as just a stable synchronized and superposed bundle of DeBroglie waves, and so also is a charged particle. The charged particle, however, represents a holographic closure of space, and a consequent bending of every DeBroglie

wave in the universe, at a rate approximately 10^{-2} times as great (for an electron) as does the macroscopic universal corpuscle (Einstein's spherical model of the cosmos). Perfect control of the bending of ordinary three-dimensional space would enable the rate of closure of space to be chosen at will; hence any size desired could be achieved.

Thus one has developed a mechanism for antigravity and for the materialization and dematerialization of matter if the three major hypotheses developed are valid: first, that the nature of a photon is as shown in Figure 5; second, that Equation (8) states the condition for the interaction of DeBroglie waves and a mass; third, that the nature of this interaction is orthogonal to three-dimensional observer space and hence timelike, as shown in Figure 9. Since all of these hypotheses fit the Bohr conditions, they are consistent with the discrete energy levels of an atom. Because space is known to be bendable from general relativity, the condition shown in Figure 5 can simply be assumed to exist. This approach establishes the basic validity of the first hypothesis beyond reasonable question.

DeBroglie waves are created by macroscopic bodies as well as by microscopic particles. Thus the hypotheses suggest that macroscopic devices could perhaps be constructed to demonstrate and yield the effects stated: antigravity, materialization, and dematerialization. Such devices, if successful, should then lead to the hyperspace drive, or direct matter teleportation throughout the universe.

It should also be pointed out that the basic mechanism involved does not require substantial energy at all. Every mass easily absorbs and emits photons, which processes themselves involve the 90° orthorotation of mass (Δm) into a photon (emission) and the 90° orthorotation of a photon (ΔE) into mass (absorption). Atomic collision can also induce the process, as should the synchronous interaction of phonons or excitons. So many effects are available to give the 90° orthorotation of mass or energy that the possibility of building macroscopic devices appears encouraging.

We live in a day when new and startling phenomena of nature are continuing to be revealed. The astrophysicists and astronomers are still working out the implications of black holes and white holes in space, and yet the telescopes have indeed revealed strange objects that may be black holes and white holes. Quantum geometrodynamics is a "timebomb ticking away at the heart of physics" [18], as indeed is the many-worlds interpretation of quantum mechanics [19]. Even with this knowledge, there is still no clear understanding of the most fundamental things: time, space, mass, charge, and being are as mysterious as ever. We must not assume that we have penetrated the heart of unlimited and ultimate reality merely because we have discovered some equations of powerful descriptive power. We are only at the beginning of science, we are not at the end.

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